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## **Beyond the UAUT: Questionnaire study examining the acceptance of a web-based team development tool aimed at improving work-related wellbeing in nurses**

Broetje, Sylvia ; Bauer, Georg F ; Jenny, Gregor J

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# Beyond the UAUT: Questionnaire study examining the acceptance of a web-based team development tool aimed at improving work-related wellbeing in nurses

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## Abstract

**Background:** The aim of this study is to examine the factors predicting the acceptance of a digitally-supported leadership and team development tool among nurse managers in three German-speaking countries.

**Objective:** The tool supports leaders in conducting a participatory intervention that is aimed at enhancing wellbeing and motivation of staff by identifying and addressing critical job demands and resources

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## Original Manuscript

# Beyond the UAUT: Questionnaire study examining the acceptance of a web-based team development tool aimed at improving work-related wellbeing in nurses

## INTRODUCTION

### Study aim

The aim of this study is to examine the factors predicting the acceptance of a digitally-supported leadership and team development tool among nurse managers in three German-speaking countries. The tool supports leaders in conducting a participatory intervention that is aimed at enhancing wellbeing and motivation of staff by identifying and addressing critical job demands and resources. The tool combines an online teaching and coaching approach with a team survey and an in-person team workshop. As a complex tool consisting of innovative technological as well as procedural aspects, we expect predictors beyond those of the unified theory of acceptance and use of technology (UTAUT) to be relevant in determining its acceptance, specifically, capacities on the level of the self, team and organization. Understanding what shapes acceptance can inform future research on group-level workplace health interventions and can help to identify aspects that can enhance the fit of such interventions.

### Workplace health interventions

Workplace health programs can produce beneficial health- and business-related outcomes (Brunton et al., 2016; Kuoppala et al., 2008, Richardson and Rothstein, 2008). However, these interventions have traditionally focused on targeting lifestyle behaviors of individuals, supporting them, for example, in quitting smoking, increasing their physical activity or managing their stress levels, while neglecting the role played by working conditions and the responsibility of organizations in ensuring workers' health (Lehr et al., 2016a). Data collected during a large-scale stress management intervention conducted in Switzerland showed that a favorable ratio of job resources to job demands was associated with lower exhaustion and absenteeism as well as higher engagement and productivity (Jenny et al., 2020), and reviews indicate that at least some organization-level interventions aimed at improving working conditions can positively affect outcomes such as mental health, physical health, absenteeism or staff turnover (Bambra et al., 2007; Bond et al., 2006).

At the same time, the ongoing megatrend of digitization has led to an increase in the delivery of interventions in a digital format. The most common forms of health technology are health apps, wearables and health portals (Deloitte, 2014). Such approaches have been found work to improve mental health in general population samples (Heber et al., 2017; Lehr et al., 2016b) as well as in employees (Stratton et al., 2017). However, no digital interventions have, to our knowledge, aimed at improving health and wellbeing in employees via the improvement of work organization. Given their potential for improving worker health and the novelty of this approach, it is important to understand what influences their acceptance.

## Wecoach and approach

The wecoach (www.wecoach.ch) is a web-based tool that combines both a digital and a participatory approach and empowers team leaders to assess and address working conditions through a health-oriented team development process. Leaders and teams are optimal units for workplace health promotion (Bauer and Jenny, 2018). Leaders not only play an important role in the implementation of interventions (Nielsen, 2017). Teams and leaders are also the level on which many job demands and resources are created and they can develop interventions tailored to their own situation, which enhances their acceptance. The participation of the team in this process also enhances ownership of the intervention and facilitates learning and communication.

Most off-line workplace health interventions follow a cycle with several steps, comprising stages of preparation, action, and anchoring (Nielsen and Abildgaard, 2013). The wecoach follows this approach. It works through an automated chat, based on “if-then” rules that guides the team leader through a systematic project cycle. The leader begins working through this cycle by him- or herself and then involves the team in the later stages. The chat advises the leader on which session to complete next and presents information on work and health, training materials, self-assessments, and online tools to conduct team surveys and workshops, as well as self-evaluation of progress and effectiveness. The team survey assesses job demands and resources with validated scales and the team workshop builds on these results. It is moderated by the team leader, who has been provided with material on how to organize and conduct the workshop. For an in-depth description of the wecoach, its intervention architecture and elements, please see Grimm et al. (2020).

## Acceptance of innovations

According to Rogers (1995, 2003), the adoption of innovations is a five-step process, leading from (1) knowledge about the product to (2) persuasion of the product, (3) decision to adopt - or reject - the product to its (4) implementation and (5) confirmation that one has made the right decision. During the stage of persuasion, an opinion about the product is formed, which is influenced by different characteristics of the product. These characteristics stem from attributes of the product itself, as well as from relevant outside factors, such as current needs or compatibility with other products. In accordance with this model, we view acceptance as the phase of formation of attitudes and use intentions that precedes the adoption of a product.

Previous research has focused on the effectiveness of workplace health interventions, while aspects

of acceptance and implementation have received little attention. This, however, is changing (Nielsen and Miraglia, 2017). If digital workplace health interventions are to realize their potential, they must not only be effective and well-implemented, supporting their internal and external validity, but they first need to be accepted by potential users.

## UTAUT

The unified theory of acceptance and use of technology (UTAUT, Venkatesh et al., 2003) is one of the most widely used models of technology acceptance. It examines the factors that explain the intention to use new technologies, especially in organizational contexts. It was developed empirically and integrates elements from eight established models, including traditional psychological theories like the theory of reasoned action (Fishbein and Ajzen, 1975) and social cognitive theory (Bandura, 1986; Compeau and Higgins, 1995) as well as other technology-related models like the technology acceptance model (Davis, 1989). Citations of the UTAUT continue to rise, indicating its ongoing relevance (Venkatesh et al., 2016).

The UTAUT model is illustrated in figure 1. It proposes four independent predictors, three of which influence behavioral intention, which can be described as the interest or willingness of respondents to use the system. A fourth predictor as well as behavioral intention influence use behavior. Use behavior is often assessed through the self-reported use of the technology, either in binary terms or regarding the frequency or duration of use. Based on the original eight theories from which the UTAUT was synthesized, gender, age, voluntariness and experience were also included into the model as moderators. In this context of this study, however, UB and moderators will not be examined. To account for the leadership and team development component of the wecoach, we also adapted the definitions of the UTAUT predictors and use them as follows:

Performance Expectancy describes degree to which the user expects that using the wecoach will help him or her carry out a team development process.

Effort Expectancy can be explained as the anticipated complexity of the wecoach tool and the degree of energy needed to use it.

Social Influence refers to the believe of important others that the individual should use the wecoach tool to carry out a team development process.

Facilitating Conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the wecoach tool

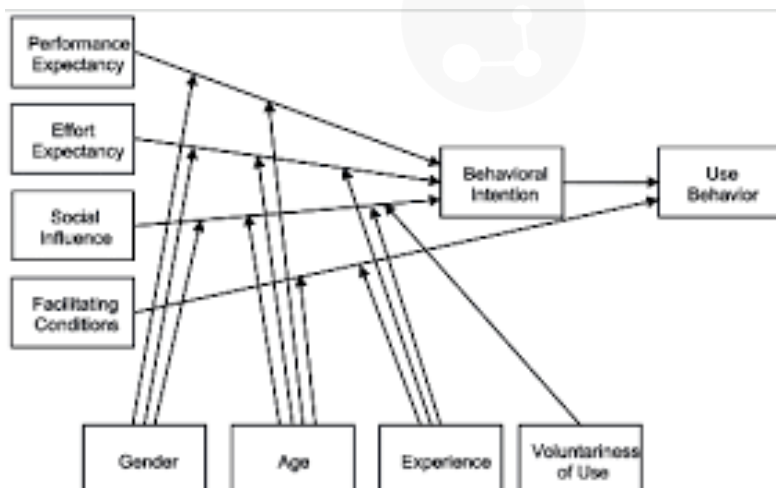




Figure 1. The UTAUT Model (Venkatesh et al., 2003)

The UTAUT has been applied in different contexts, especially to study the acceptance of online banking (Foon and Fah, 2011), general information technology (Workman, 2014), e-government services (Rodrigues et al., 2016) or e-learning tools (Thomas et al., 2013). Among healthcare professionals, it has been used predominantly to examine factors influencing the acceptance of electronic medical records (Chiu and Ku, 2015; Hennington and Janz, 2007; Wills et al., 2008).

A meta-analysis of 74 studies (Khechine et al., 2016), confirmed the strength and robustness of the UTAUT and corroborated findings from a previous meta-analysis by Taiwo and Downe (2013). Performance expectancy was identified as the strongest predictor of behavioral intention, with a correlation coefficient from  $Z_r$  of .50. This indicates that users will be keen to use a technology when they believe that it would improve their productivity, efficiency, and effectiveness. The second largest effect was from facilitating conditions to behavioral intention ( $r = .50$ ), a relationship that was not proposed in the original model, but that had been examined in many empirical studies. This relationship was in fact larger than the proposed one between facilitating conditions and use behavior ( $r = .36$ ). The correlations coefficients for the other relationships were effort expectancy-behavioral intention:  $r = .46$ ; social influences-behavioral intention:  $r = 0.40$  and behavioral intention-use behavior:  $r = .46$ . The latter indicates that the intention to use a technology does indeed predict the use of it, which is in line with other findings (Turner et al., 2010). The moderators proposed in the UTAUT have rarely been examined in empirical studies (Khechine et al., 2016; Venkatesh et al., 2016) and were not considered in the meta-analysis. Venkatesh et al. (2016) have also later distanced themselves from the inclusion of moderators in the model and suggest a focus on the main effects for enhanced parsimony. All of these relationships were within the 95% confidence interval, however, two of them, facilitating conditions-behavioral intention and facilitating conditions-use behavior, did not pass the failsafe test, which refers to the numbers of additional studies that would be required to reject the assumption of a significant relationship. Hence, further investigation into the role of facilitating conditions in predicting acceptance of technology is necessary.

Based on the assumptions of the UTAUT Model (Venkatesh et al., 2003) and recent meta-analytic findings (Khechine et al., 2016) we expect the four predictors of the UTAUT model to contribute to the acceptance of wecoach, operationalized as behavioral intentions. Our first hypothesis states that:

- H1a:** Performance expectancy contributes to the intention to use the wecoach.
- H1b:** Effort expectancy contributes to the intention to use the wecoach.
- H1c:** Social influences contribute to the intention to use the wecoach.
- H1d:** Facilitating conditions contribute to the intention to use the wecoach.

## UTAUT extensions

The wecoach is not only a technological innovation replacing a formerly established way of completing a task with a digital tool. It also includes an innovative intervention approach that affects different organizational levels. For this reason, we consider it necessary to broaden the range of predictors used in our study. Attitudes or beliefs relating to the affected organizational levels may serve as the gateway to considering using such a tool, even before taking into account aspects such as usefulness or user-friendliness, especially when the use of the tool is entirely voluntary and not mandated by the organization.

Extensions to the UTAUT have been commonly applied, and Venkatesh et al. (2016) differentiate between exogenous, endogenous or moderating extensions to the UTAUT. Common variables include self-efficacy, attitudes or trust (Williams et al., 2015). Our study model adds three endogenous variables to the UTAUT, derived from the organizational health development (OHD) model (Jenny and Bauer, 2013): capacities on the level of the self (CapSelf), which in the context of this study is the leader, capacities on level of the team (CapTeam) and capacities on the level of the organization (CapOrg). The OHD model emphasizes the interaction between the competence, motivation and identity of the individual on the one hand and the structure, strategy and culture of the organization on the other hand in maintaining and improving work-related health (Bauer and Jenny, 2012). These capacities on the level of the individual and the level of the organization mirror each other and connecting to them enhances the fit of an intervention. At the same time, these capacities are self-reinforcing, meaning they support a successful OHD, which then, in turn, enhances the capacities. In accordance with the “IGLO” model (Nielsen et al., 2013, 2017), we also added an additional intermediary group level, while, for the purposes of our study, the level of the individual reflects the leaders and managers.

We expect that the capacities on all three levels will yield a positive effect on the acceptance of the wecoach, that is the intention to use the wecoach. Our second hypothesis thus states that:

**H2a:** CapSelf contributes to the intention to use the wecoach.

**H2b:** CapTeam contributes to the intention to use the wecoach.

**H2c:** CapOrg contributes to the intention to use the wecoach.

Figure 2 illustrates our study model with predictors from the UTAUT and OHD model.

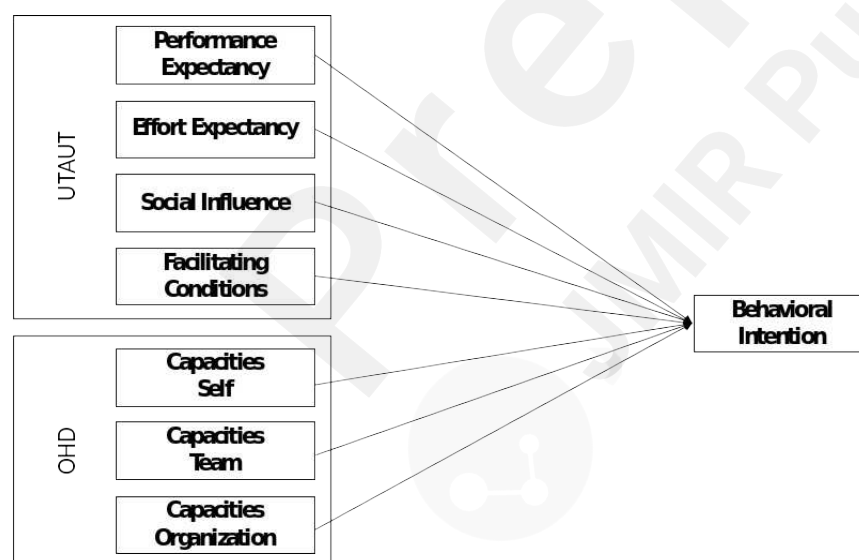


Figure 2. Our study model

UTAUT = Unified theory of acceptance and use of technology (Venkatesh et al., 2003)

OHD = Organizational health development model (Jenny and Bauer, 2013)

## METHODS

## Participants and Procedure

The participants in our study were nurse managers and nurse executives working in hospitals or nursing homes in Switzerland, Austria and Germany. Participants were identified by searching databases or publicly available lists of hospitals and nursing homes in all three countries. In some cases, an email address for the nursing director was directly available. In other cases, organization websites were listed, which were then searched for contact information of nursing directors, nurse managers or other staff, such as human resource personnel, who might be in charge of team development or occupational health.

We contacted all of the largest hospitals and nursing homes in all three countries. Additionally, using an online random generator, we also selected subsets of small and medium-sized organizations in each canton or state. The identified contacts were invited by email to participate in our study and a flyer with study information was included. Participation in the study involved completing several introductory modules of the wecoach and then answering our online questionnaire (all in German; total time approximately 60 to 90 minutes). We sent out emails to 2269 recipients deemed suitable for participating in or sharing the information about the study. Persons interested in participating contacted the first author. An account with full wecoach access was created for them and they were sent the login information as well as detailed study information and the informed consent form, which participants were instructed to return. Participants were asked to complete four modules of the wecoach. The first module acquainted them with the technical interface, such as the chatbot and interactive forms. It also introduced them to general information about work and stress and asked them about their current level of confidence in doing a health-oriented team development. The second module deepened the understanding of work, stress and engagement, introduced users to the job demands resources model (Demerouti et al., 2001) and provided an introduction to the team survey which is based on this model. In the third module, users learned how the team survey works and analyzed their own work situation. In the fourth module they learned about the basic principles of the team development approach and practiced developing measures for improving one of their own job resources and job demands. These four modules represent only a selection of the full wecoach and were chosen to provide participants with a good overview of the team development approach and the technology of the wecoach, while not requiring too much time. However, participants were free to move around the wecoach and go over different modules as they pleased.

As an incentive, participants retained access to their fully active wecoach account, which allows them to conduct the entire team development process, including a team survey and workshop with their staff, free of charge (value: 1590 Swiss Francs, approximately xxxx US-Dollar). 105 persons registered to participate in the study, however, many did not complete the wecoach modules or the questionnaire. The emails we received indicate that this was mainly due to time constraints. To encourage participation, we later provided an incentive of a raffle of five gift certificates for an online store worth 50 Euros each (approximately 54 US-Dollar).

## Measures

We assessed the variables of the UTAUT by modifying the items used by Venkatesh et al. (2003). We attempted to maintain the meaning of the original items while re-phrasing them slightly based on our adapted UTAUT definitions presented in the introduction. For example, rather than the statement "Using the system enables me to accomplish my tasks more quickly" we utilized "I think that the wecoach can enable me to conduct a team development more efficiently". Since the items were also

adjusted rather than merely translated, no back-translation was done. Performance expectancy was assessed with five items, such as "I think the wecoach is useful for conducting a team development". Effort expectancy was assessed with five items such as: "I think that the use of the wecoach is easy to learn". Social Influence was assessed with four items such as "I think upper management would endorse the use of the wecoach for a team development". Facilitating Conditions was assessed with six items such as "I have the technological know-how to be able to use the wecoach". Behavioral intention was assessed with three items such as "I intend to use the wecoach within the next six months". Participants responded to all of these on seven-point scales ranging from "strongly disagree" to "strongly agree".

We assess the capacities for the team development approach based on the OHD model. For the CapSelf and CapTeam scales, three items each asked about the competence to conduct such a team development, the motivation to do so and its fit either with the own leadership style or the team culture. For CapOrg, three items assessed the availability of the resources to conduct such a team development as well its fit with the organizational goals and culture. Sample items include "I am motivated to do such a team development" (CapSelf, motivation), "Such a team development fits with our team culture" (CapTeam, identity) and "Conducting such a team development is in line with our organizational goals" (CapOrg, strategy). All nine items were assessed on seven-point scales ranging from "strongly disagree" to "strongly agree". Additional data collected were demographics, work setting, leadership role and voluntariness of testing the wecoach.

## Analysis

All statistical analyses were performed with SPSS 24. We began by determining the quality of our scales and examining descriptives and correlations. This was followed by testing the assumptions for regression analysis. Variables that were significantly correlated with our outcome variable behavioral intention were entered into a multiple linear regression model.

## RESULTS

### Sample Characteristics

36 participants reviewed the wecoach and completed our questionnaire. Four were removed from the analysis for the following reasons: One participant indicated not having a leadership role and two indicated not working in a hospital or long-term care setting. The fourth participant did not register for the study and only had access to the free trial version of the tool. Our attempts to contact this person were unsuccessful. Our final sample comprised of 32 persons. Descriptive data on our sample is presented in table. 1.

	sex	volunt_wecoach_rec	work_setting	work_country	lead_level	lead_span_re c	lead_exp	time_org_rec	int_focusgroup	ttm_rec
N	Valid	32	32	32	32	32	32	32	32	32
	Missing	0	0	0	0	0	0	0	0	0

	N	Minimum	Maximum	Mean	Deviation
bi_mean	32	1.00	7.00	4.3958	1.93522
pe_mean	32	3.20	7.00	5.5688	.99302
ee_mean	32	3.40	7.00	5.6688	.88370
si_1234_mean	32	2.25	6.75	4.7813	1.02538
fc_mean	32	2.33	6.33	4.6510	.98133
cap_self_mean	32	2.33	7.00	5.6875	.99798
cap_self_wins	32	4.67	7.00	5.8125	.67169
cap_team_mean	32	1.67	6.00	4.8021	1.14804
cap_org_mean	32	2.00	7.00	4.4479	1.36418
age_years	32	29	57	40.56	7.758
minutes_wecoach	32	23	420	137.75	103.207
Valid N (listwise)	32				

## Preliminary Analyses

The internal reliabilities for all scales were at least satisfactory, ranging from .719 for facilitating conditions to .933 for CapTeam. All variables were examined for outliers based on 2.2 interquartile ranges (Hoaglin et al., 1986). Two extreme low values were identified on the variable CapSelf, and were winsorized by replacing them with the next lowest value found in our dataset that was not an outlier.

Inspection of our outcome variable behavioral intention questioned its normal distribution, which was supported by a significant Shapiro Wilk test ( $p = .020$ ,  $df = 32$ ). Thus, we proceeded with our analyses using Spearman for correlation analyses and Kruskal Wallis for group comparisons.

## Findings

The variable of greatest interest to us was behavioral intention, as an indicator of acceptance. Its mean level can be described as moderate. Of all assessed variables, it showed the highest degree of variability among participants. Table 2 displays the descriptives for behavioral intention as well as all predictors.

We assessed group differences on these scores based on sex, age, country and leadership level. Note that no group comparisons were conducted for work setting, since 28 of our final 32 participants worked in hospitals while only two worked in long-term care and two in psychiatric acute care. No significant group differences were found on any of these variables.

Correlations between variables were in the anticipated direction and are displayed in table 3. The following variables were significantly correlated with behavioral intention: performance expectancy, effort expectancy, social influences, facilitating conditions and CapTeam. These predictors were entered into a multiple regression model. The assumptions for linear regression were tested and all met, with the possible issue of multicollinearity between social influences and facilitating conditions, which correlated at .776. Examination of the collinearity statistics found the lowest tolerance for facilitating conditions at .273 (with a variance inflation factor of 3.661) and social influences at .279 (with a variance inflation factor of 3,582). Depending on the chosen cut-off, these values can still be considered tolerable. We proceeded with the multiple linear regression analyses and began by including all five predictors simultaneously, using the Enter method. This allowed us to examine the overall predictive power of the predictors together as well as examine their respective beta weights. The model explained 43.9 percent of the variance in behavioral intention ( $\text{adj. } r^2 = .331$ ). None of



the predictors reached significance. CapTeam was the strongest predictor (stand. beta = .288,  $p = .175$ ), followed, in declining order, by performance expectancy (stand. beta = .226,  $p = .212$ ), social influences (stand. beta = .215,  $p = .447$ ), facilitating conditions (stand. beta = .065,  $p = .818$ ), and lastly, effort expectancy (stand. beta = .007,  $p = .971$ ).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.013	2.240		-1.345	.190
	pe_mean	.441	.345	.226	1.280	.212
	ee_mean	.015	.405	.007	.037	.971
	si_1234_mean	.405	.525	.215	.772	.447
	fc_mean	.129	.554	.065	.232	.818
	cap_team_mean	.485	.349	.288	1.390	.176

a. Dependent Variable: bi\_mean

A hierarchical analysis using the Enter method with CapTeam in the first block and the four UTAUT predictors in the second block found that CapTeam alone explained 33.9 percent of the variance (adj.  $r^2 = .316$ ) in behavioral intention, to which the UTAUT predictors together added another 10 percent for a total variance explanation of again 43.9 percent (adj.  $r^2 = .331$ ). This was not a significant increase. CapTeam was the only significant predictor (stand. beta = .582,  $p = .000$ , 95%-CI = .469 - 1.492). Post-hoc power analysis using G\*Power (Faul et al., 2009) estimated the power of our regression analyses at .955.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change	Durbin-Watson
						F Change	df1	df2		
1	.582 <sup>a</sup>	.338	.316	1.60015	.338	15.342	1	30	.000	
2	.662 <sup>b</sup>	.439	.331	1.58312	.100	1.162	4	26	.350	1.561

a. Predictors: (Constant), cap\_team\_mean

b. Predictors: (Constant), cap\_team\_mean, ee\_mean, pe\_mean, si\_1234\_mean, fc\_mean

c. Dependent Variable: bi\_mean

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.313	1.235		-.253	.802
	cap_team_mean	.981	.250	.582	3.917	.000
2	(Constant)	-3.013	2.240		-1.345	.190
	cap_team_mean	.485	.349	.288	1.390	.176
	pe_mean	.441	.345	.226	1.280	.212
	ee_mean	.015	.405	.007	.037	.971
	si_1234_mean	.405	.525	.215	.772	.447
	fc_mean	.129	.554	.065	.232	.818

a. Dependent Variable: bi\_mean

Our findings were not able to confirm any of our hypotheses regarding the predictors of the UTAUT model. Neither performance expectancy, effort expectancy, social influences nor facilitating conditions were significant predictors of acceptance, indicated by behavioral intention. Of the three levels of capacities derived from the OHD model, only CapTeam found to be a significant predictor and was indeed the main predictor of acceptance. Neither CapSelf nor CapOrg significantly contributed to behavioral intention. In summary, only hypothesis 2b was confirmed.

## DISCUSSION

### Allgemeine Aussage

UTAUT nicht fuer diesen Kontext passend bzw. ausreichend.

wecoach vielleicht zu komplex

Users may have perceived the wecoach as a the team development approach and not viewed it as a technological tool.

Dass dann dabei herauskommt, dass die Teamebene besonders wichtig ist, macht ja auch Sinn, denn an die Ebene richtet sich der wecoach ja auch.

PE is significantly related to BI, but goes 'floeten' when including Capacities.

Siehe auch Studie Apolinario, in denen bei Hinzunahme von Attitudes die UTAUT-Variablen auch nicht mehr signifikant wurden.

Auf jeden Fall betonen, warum capacities team hier eine so grosse Rolle zu spielen scheinen.

Relevanz von Fit of interventions

Randall, Noelsen fit: 2012: Two dimensions of fit: Fit both on the level of the individual employee and the organizational context.[we might add to that the team level]

### Weiteres:

Previous resarch found SI oly to be relevant in mandatory settings.

SI seems ot be more salient for female and older workers (that could maybe explain why it is higher in our findings)

Man bedenke: mein Sample waren ja schienbar ueberweiegend Bereichsleiter. Was heisst das denn dann eigentlich, wenn die sagen, das past nicht fuer mein Team? Meinen sie damit dann primär die ihnen unterstellten Teamleiter? Ist ja auch eine interessante Aussage, dass sie das so auf ihr Team attribuieren.

### Outlook and Limitations

Moderation analysis would have been useful if sample size had allowed it.

Longitudinal data better for predicting behaviour.

Biased data. Only small percentage of those invited to participate did.

Hospital employees overrepresented.

Therefore, this commentary encourages researchers to investigate other psychological notions of IT acceptance (i.e., besides intention or attitude directed primarily at extent of use) that may in turn be more strongly connected to alternative modes of IT use.

<https://aisel.aisnet.org/jais/vol8/iss4/4/>

Looking Forward: Toward an Understanding of the Nature and Definition of IT Acceptance

Studie Apolinario et al., 2019, die nebst UTAUT auch attitudes mit drin hatten (was dann am Ende bei denen auch das einzige war, was in der MLR signifikant wurde).

Brunton 9pd) major impat of leadership

Hannon

Workplace Health Promotion Implementation, Readiness, and Capacity Among Mid-Sized Employers in Low-Wage Industries: A National Survey

"Readiness scales showed that employers believe WHP would benefit their employees and their

companies, but they were less likely to believe that WHP was feasible for their companies. Employers' capacity to implement WHP was very low; nearly half the sample reported no capacity."





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